

THE ASTRONOMICAL JOURNAL

FOUNDED BY B. A. GOULD

PUBLISHED FOR THE AMERICAN ASTRONOMICAL SOCIETY
BY THE AMERICAN INSTITUTE OF PHYSICS INC.

Editors

DIRK BROUWER

G. M. CLEMENCE

Assistant Editors

MARY S. ALBEE

MARRET McCORKLE

Associate Editors

SIDNEY McCUSKEY

Warner and Swasey Observatory

FRED L. WHIPPLE

Smithsonian Astrophysical Observatory

HAROLD F. WEAVER

Leuschner Observatory

JOHN A. O'KEEFE

NASA, Goddard Space Flight Center

VOLUME 69

1964

NUMBERS 1316-1325

Editorial Office: Yale University Observatory, New Haven 11, Connecticut

Publications Office: American Institute of Physics Inc., New York 17, New York

Printed at: Lancaster Press Inc., Lancaster, Pennsylvania

CONTENTS

NUMBER 1316

SYMPOSIUM ON RADAR AND RADIOMETRIC OBSERVATIONS OF VENUS DURING THE 1962 CONJUNCTION

Introduction, by F. T. Barath.....	1
Study of Venus by CW radar, by R. L. Carpenter.....	2
Venus characteristics by earth-based radar, by R. M. Goldstein.....	12
Radar observations of Venus at 38 Mc/sec, by J. C. James and R. P. Ingalls.....	19
Radar echoes from Venus at 50 Mc/sec, by W. K. Klemperer, G. R. Ochs, and K. L. Bowles.....	22
Further Venus radar depolarization experiments, by G. S. Levy and D. Schuster.....	29
Radar scattering from Venus and the Moon, by D. O. Muhleman.....	34
Faraday rotation of Venus radar echoes, by D. Schuster and G. S. Levy.....	42
Mariner 2 microwave radiometer experiment and results, by F. T. Barath, A. H. Barrett, J. Copeland, D. E. Jones, and A. E. Lilley.....	49
Some decimeter observations of Venus during the 1962 conjunction, by B. G. Clark, and C. L. Spencer.....	59
Microwave observations of Venus, 1962-1963, by F. D. Drake.....	62
Observations of Venus, the region of Taurus A, and the Moon at 8.5-millimeter wavelength, by V. L. Lynn, M. L. Meeks, and M. D. Sohigian.....	65
Observations of Venus at 2.07 cm, by T. P. McCullough and J. W. Boland.....	68
Observations of Venus, the Sun, Moon, and Tau A at 1.18-cm wavelength, by D. H. Staelin, A. H. Barrett, and B. R. Kusse.....	69
Radio emission from Venus at 8.35 mm, by D. D. Thornton and W. J. Welch.....	71
The applicability of the third integral of motion: Some numerical experiments, by Michel Hénon and Carl Heiles.....	73
Kinematic studies of early-type stars. II. The velocity field within 2 kiloparsecs of the Sun, by Vera C. Rubin and Jaylee Burley.....	80
The eclipsing system, RS Leporis, by William J. Klepczynski and Frank Bradshaw Wood.....	92
On the coincidence of OB stars with neutral hydrogen in the Cygnus arm, by Duane O. Muhleman and Russel G. Walker.....	95
Some salient features of the occurrence of meteors, by C. S. L. Keay.....	98
Stellar space density near selected area 158, by S. W. McCuskey.....	104
BD+30°2163, a new W UMa variable, by B. Paczynski.....	124
Period changes of the Cepheid variable HV 953, by Kenneth A. Janes.....	131

NUMBER 1317

Abstracts of Papers Presented at the 115th Meeting of the American Astronomical Society, held 26-28 December 1963, at Georgetown University, Washington, D. C.....	133
The orbital elements of RZ Comae, by L. Binnendijk.....	154
The light variation and orbital elements of DK Cygni, by L. Binnendijk.....	157
Stability of the triangular points in the elliptic restricted problem of three bodies, by J. M. A. Danby.....	165
Rediscussion of Maxwell's Adams Prize Essay on the stability of Saturn's rings, by A. F. Cook and F. A. Franklin.....	173
A photographic optical semidiameter of Venus, by Bradford A. Smith.....	201
Measurements of the flux density of discrete radio sources at decimeter wavelengths, by Kenneth I. Kellermann.....	205
Frequency of ultraviolet excesses among late-type dwarfs in the solar neighborhood, by J. M. Marlborough.....	215
NEW BOOKS RECEIVED.....	220

NUMBER 1318

Note on variability of the time standard due to the relativistic effect, by Shinko Aoki.....	221
An improved theory of motion of an artificial satellite, by Boris Garfinkel.....	223
On the elliptic restricted problem of three bodies, by Victor Szebehely and Giorgio E. O. Giacaglia.....	230
Light curves of five supernovae, by F. Bertola.....	236
Dynamic effects of variable <i>G</i> or variable mass, by M. P. Savedoff and S. Vila.....	242
Cygnus X region at 610.5 Mc/sec, by K. S. Yang and L. A. West.....	246
A photoelectric search for ultra-short-period variable stars, by James R. McCullough.....	251
An application of rigorous method of reduction to the proper motion of 3C273, by William H. Jefferys, III.....	255
The period-luminosity relation for W Virginis stars, by J. D. Fernie.....	258
Observatory Report, Kitt Peak.....	262

NUMBER 1319

A radio survey of galaxies, by D. S. Heeschen and C. M. Wade.....	277
Neutral hydrogen near the north galactic pole, by Nanniellou H. Dieter.....	288
The stability of the triangular Lagrangian points in the general problem of three bodies, by J. M. A. Danby.....	294
The eclipsing system AL Velorum, by Frank Bradshaw Wood and R. R. Richardson.....	297

Fifteen variable stars in Sagittarius, by Dorrit Hoffleit	301
The influence of high-order zonal harmonics on the motion of an artificial satellite without drag, by Giorgio E. O. Giacaglia	303
Perturbations of the regularized equations of the restricted problem of three bodies, by Victor Szebehely	309
NOTES AND OBSERVATIONS: Minima of eclipsing stars, by W. S. Fitch	316

NUMBER 1320

SYMPOSIUM ON INSTRUMENTAL ASTRONOMY

Introduction, by A. B. Meinel	317
Interferometer observation of binary stars, by W. S. Finsen	319
Interferometric studies of emission nebulosities, by G. Courtes	325
Actual possibilities of astronomical infrared spectroscopy by interferometry and Fourier transformation, by L. Delbouille, G. Roland, and H. A. Gebbie	334
Interference coatings for astronomical optical instruments, by Philip W. Baumeister	338
Mars observations from Stratoscope II, by R. E. Danielson, J. E. Gaustad, M. Schwarzschild, H. F. Weaver, and N. J. Woolf	344
The Stanford compound-grating interferometer, by J. S. Picken and G. Swarup	353
Spectrophotometry of Algol, by Emery S. Fletcher	357
Times of minima and light curve variations of W Ursae Majoris, by William Blitzstein and Kyong Choi Chou	365
Computation of apparent places for the southern reference star program, by F. P. Scott and J. A. Hughes	368
A method for evaluating the elliptic E terms of the aberration, by Francis P. Scott	372
1417 Mc/sec observations of M31, by John Leibacher	374
Lunar crater counts, by Raph B. Baldwin	377

NUMBER 1321

Differential corrections applied to the Izsak equations of artificial satellite motion, by William A. Allen and Werner E. Knolle	393
Parallax, proper motion, and orbital motion of the components of the quintuple system ξ Scorpii- Σ 1999 from photographs taken with the 24-inch Sproul refractor, by Peter van de Kamp and Robert S. Harrington	402
Parallax and mass ratio of Σ 2173 from photographs taken with the Sproul 24-inch refractor, by David F. Gray	406
Photoelectric photometry of Zeta Aurigae in the 1963-64 eclipse, by Yoji Kondo and Allen Joel Harris	409
Galactic structure in Cassiopeia, by S. W. McCuskey and Nancy Houk	412
Distribution of stars in the Ursa Minor dwarf galaxy, by Paul W. Hodge	438
Integrated UBV photometry of members of the Leo group of galaxies, by Carol J. Webb	442
Note on quantum effects in radiometer observations, by T. Hagfors and M. L. Meeks	447
Interferometer test of the 26-inch refractor at Leander McCormick Observatory, by James B. Saunders	449
NOTICE	452

NUMBER 1322

The zonal harmonic perturbations of an artificial satellite, by Boris Garfinkel and Gregory T. McAllister	453
Collinear libration points, by Victor Szebehely and Carol A. Williams	460
Parallax and orbital motion of the astrometric binary Mu Cassiopeiae from photographs taken with the Sproul 24-inch refractor, by Sarah Lee Lippincott and Susan Wyckoff	471
Changes in the periods of RRab variables in ω Centauri, by Emilia Pisani Belserene	475
Three-color photometry of Mare Crisium during the total eclipse of 30 December 1963, by Satoshi Matsushima and John R. Zink	481
Radar investigation of meteors of subvisual magnitudes, by Colin S. L. Keay	484
Atomic hydrogen in galaxies, by Eugene E. Epstein	490
Preliminary investigations of model distributions of atomic hydrogen in galaxies, by Eugene E. Epstein	521
NOTICE: Use of Kitt Peak National Observatory Facilities by Visitors	527
ANNOUNCEMENTS	528

NUMBER 1323

Abstracts of Papers presented at the 116th Meeting of the American Astronomical Society, held 24-27 June 1964, at Arizona State College, Flagstaff, Arizona	529
Addition theorem for a derivative of a Legendre polynomial, by Boris Garfinkel	567
Colors, luminosities, and motions of the nearer G-type stars, by O. J. Eggen	570
Five-color photometry of variable star field IV in M31 by, Sidney van den Bergh	610
Detailed photoelectric photometry of the Moon, by Robert L. Wildey and Howard A. Pohn	619
Properties of Galaxies: color-magnitude diagram, by Craig Chester and Morton S. Roberts	635
A catalogue of linear polarization characteristics of radio sources in the wavelength range 10 to 21 cm, by D. Morris and G. L. Berge	642
ERRATUM: The zonal harmonic perturbations of an artificial satellite, by Boris Garfinkel and Gregory T. McAllister	648

NUMBER 1324

OBSERVATORY REPORTS	649
B - B and V - I colors of giant M stars, by Victor M. Blanco	730
Luminosity classification of galaxies and some applications, by G. de Vaucouleurs	737
Two-color composite photographs of M 33, by Merle F. Walker	744
An inter-galactic obscuring cloud? by Charles T. Kowal	757
Supernova 1956a of type I in NGC 3992, by F. Zwicky and Maria Karpowicz	759
Photographic measures of double stars, by Charles Gasteyer and Heinrich Eichhorn	762
Accurate right ascensions for 226 radio sources, by E. B. Fomalont, T. A. Matthews, D. Morris, and J. D. Wyndham	772

FURTHER REPORTS OF OBSERVATORIES.....	785
Paralaxes and proper motions of six nearby stars from photographs taken with the Sproul 24-inch refractor, by Gail Smith Bieger	804
Parallax and orbital motion of the unresolved astrometric binary CC 1299 from photographs taken with the Sproul 24-inch refractor, by Gail Smith Bieger.....	812
Telescopes, by I. S. Bowen.....	816
Wavelength dependence of polarization. III. The lunar surface, by T. Gehrels, T. Coffeen, and D. Owings.....	826
Distribution of stars in the Draco dwarf galaxy, by Paul W. Hodge.....	853
Photoelectric observations of Zeta Aurigae during the 1963-1964 eclipse, by Cheng-Yuan Shao.....	858
Author Index to Volume 69.....	861
Subject Index to Volume 69.....	873